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Effects of STAR and TAR types nonlinearities on order selection criteria

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Abstract

This paper investigates via a simulation study the effects of nonlinearities on several commonly used order selection criteria. The most important finding of this study is that SIC, FPE, HQC and BIC perform considerably well in estimating the true autoregressive order, even in the presence of STAR or TAR nonlinearity. Thus we conclude that these criteria may be safely applied to determine the true order of STAR or TAR process.

Keywords: STAR process, TAR process, AR process, nonlinearities, order selection criteria

JEL classification: C22; C51

1. Introduction

There are ample of evidence on the presence of Smooth Transition Autoregressive (STAR) (Granger and Teräsvirta, 1993) and Threshold Transition (TAR) (Tong, 1990) types nonlinearities in economics time series (Henry et al., 2001; Taylor et al., 2001; van Dijk et al., 2002). The selection of autoregressive (AR) order *p*, normally based on certain selection criteria (Brockwell and David, 1996), is an important process in the modeling cycles of these nonlinear time series. The practicability of applying these criteria, which were originally proposed on the basis of linear frameworks, is of great interest as it has crucial implications on the eventually selected models. Başçi and Zaman (1988) and Liew and Chong (2003) have done simulation study to see the effects of nonnormal and ARCH errors on various order selection criteria. However, to the best of our knowledge, the effects of nonlinearities on these order selection criteria are yet to be determined. As such, the main objective of this study is to investigate, via simulation study, the effects of STAR and TAR types nonlinearities on the performance of some selected criteria in picking up the true autoregressive order *p*.

The most important finding of this study is that SIC, FPE, HQC and BIC perform considerably well in estimating the true autoregressive lag length, even in the presence of STAR or TAR nonlinearity.

2. STAR and TAR nonlinearities and order selection criteria

The STAR process of a series X_t (t = 1, …, T) can be expressed as

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